The economic impact of on-screen tourism: The case of The Lord of the Rings and the Hobbit

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Highlights

- The study evaluates both overall and industry-level economic impacts of on-screen tourism using The Lord of the Rings (LotR) and the Hobbit as an example.
- A new approach that combines both econometric and computable general equilibrium modelling techniques is used in the impact assessment.
- The approach can be applied to much wider context of popular culture tourism.
- The Hobbit Trilogy brought a significant impact on tourist arrivals, which leads to a growth in welfare gains but the effect of the LotR on tourism demand for New Zealand is insignificant.
- The Hobbit Trilogy brought positive effects to the tertiary industry but negative impacts on primary and secondary industries.

The Economic Impact of On-Screen Tourism: The Case of The Lord of the Rings and the Hobbit

Abstract

The economic impacts of on-screen tourism are particularly interesting, and research in this area can provide useful information to governments making decisions regarding subsidising film production and forming relevant marketing strategies. No reliable and systematic approach for measuring the economic impacts of on-screen tourism currently exists, and this study is the first to evaluate the overall economic impacts of on-screen tourism by comparing the impacts of two series of films, The Lord of the Rings and the Hobbit, both filmed in New Zealand. A new approach combining econometric and computable general equilibrium modelling techniques is used in the assessment. The results show that The Lord of the Rings did not significantly impact on the tourism and economy of New Zealand, while the Hobbit Trilogy had a significant positive impact, which may be due to effective marketing strategies and media convergence.

Key words: Film tourism, impact assessment, computable general equilibrium, New Zealand

Introduction

On-screen tourism (or screen or film tourism) refers to tourists travelling to a destination as a result of films or TV drama series (Hudson and Ritchie, 2006). Recognising the economic benefits these can bring, many governments support the development of film tourism in different ways. In 2014 the New Zealand Screen Production Grant provided a 20% baseline grant to international productions and a further 5% if the productions could generate economic benefits to the country (Tourism New Zealand, 2015). Many local governments in South Korea provide significant investment (over US$1 million in some cases) for building film sets, and by 2013, 34 film production towns had been built. However, facing financial difficulties, these towns are seeking more sustainable development (Kim, Kim and Heo, 2015). Evaluating the economic impacts of films and TV dramas on tourism demand and the local economy is important in justifying investment, and by monitoring the effects of the investment supporting future investment strategies.

The media often claim that films and TV dramas have a positive impact on a specific destination, but there is often no method of calculating this effect. New Zealand, for example, has experienced a 50% increase in inbound tourism following the success of Lord of the Rings (LotR), which brought about NZ$33 million a year, according to Tourism New

Zealand (Forbes, 2012). The extent of the impact of films and TV dramas on tourist arrivals has been previously studied (Riley, Baker and Van Doren, 1998; Busby, Huang and Jarman, 2013). Econometric models are used to evaluate the impact of films on tourism demand, in terms of tourist arrivals in a destination, but the total economic impact, in terms of the contribution to GDP and employment, has not been assessed (see Mitchell and Stewart, 2012; Kim, Chen and Su, 2009). The Computable General Equilibrium (CGE) modelling has been applied to evaluate the economic impact of on-screen tourism, but the crude estimates of the change in expenditure of tourism demand input into the model affects the reliability of the results (see Pratt, 2015).

This study aims to evaluate the overall economic impacts of film tourism, with a particular focus on the LotR and the Hobbit, on the New Zealand economy. This research makes several contributions. First, a new approach that combines both econometric and computable general equilibrium (CGE) modelling techniques is used in the impact assessment. This approach provides a more reliable, comprehensive and robust analysis of the economic contribution of on-screen tourism to the destination economy. It overcomes the weaknesses associated with individual modelling techniques and can be used to analyse the economic effect of popular culture tourism. This method can also be extended to assess the impact effect of other forms of popular culture tourism, such as literature and music tourism, that create products through creative industries (in popular culture) (Lundberg, Lexhagen and Mattsson, 2012). Second, this is the first study to evaluate and compare the different economic effects of two films, the LotR and the Hobbit. The films have numerous similarities; they are based on novels written by the same author; both are set in 'Middle Earth', the former is the sequel to the latter and both were filmed in New Zealand by the same director. The comparison is therefore interesting, and can provide valuable policy suggestions for destinations that target on-screen tourism.

Tourism is the second largest export industry in New Zealand in terms of foreign exchange earnings, and is therefore extremely important to the economy (New Zealand Tourism, 2016). International tourist arrivals doubled over the last two decades, from 1,409,000 in 1995 to 2,854,000 in 2014 (Figure 1). Major global events and crises affected these numbers, such as the 2003 SARS epidemic, the 2008 global financial crisis and the release of two series of films, the LotR and the Hobbit. These series each include three fantasy adventure films directed by Peter Jackson. The films received 38 nominations and won 18 Oscar awards; the most successful was The LotR: The Return of the Kings, which won 11 Oscars (Gunner, 2015). The LotR films have been ranked in the top 5 '100 films that defined the Noughties' (the Telegraph, 2009). The popularity of the two film series is also reflected by their box office ticket sales, which reached US$ 5,896 million worldwide (boxofficemojo, 2016). New Zealand, as the filming location of the two series, has been branded as '100% Middle Earth', linking it with the films (The Guardian, 2016). A number of themed package tours have been specifically designed for tourists who want to experience the filming

locations. For example, Hobbit on Movie Set Guided Tours provides tourists with opportunities to discover where scenes were filmed, such as the featured Green Dragon Inn (http://www.hobbitontours.com/OurTours/tabid/99/Default.aspx). This study examines whether the success of the two films has generated on-screen tourism in New Zealand.

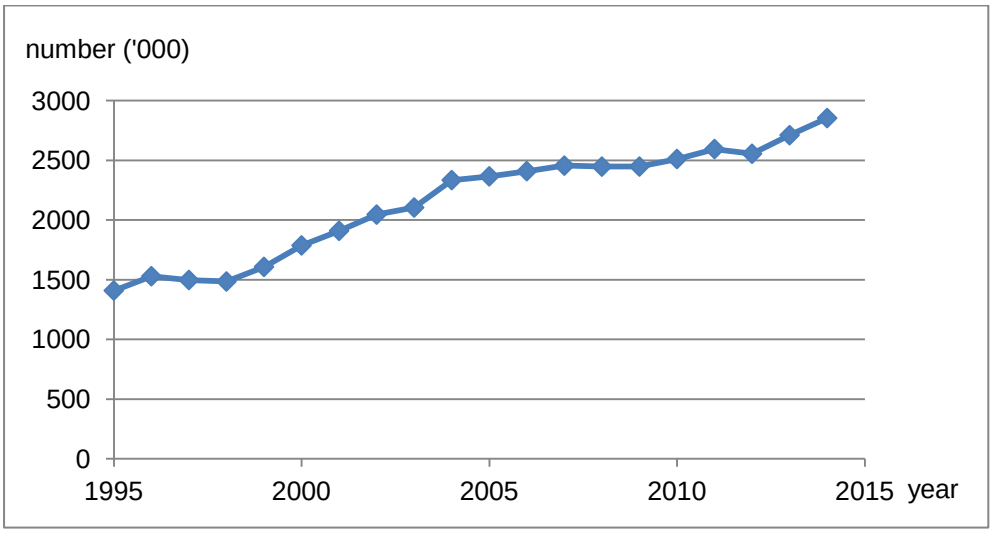

Figure 1 Annual International Tourist Arrivals in New Zealand (1995-2014)

Literature Review

On-screen Tourism

On-screen tourism is the result of the popularity of film and TV shows. This modern phenomenon is of particular research interest as it is highly demand driven (Müller, 2006), and grows rapidly. It (generally) surprises the receiving destinations, and attracts very broad target groups (Hudson and Ritchie, 2006; Lundberg, Lexhagen and Mattsson, 2012). Research within the field has developed from describing the phenomenon or calculating tourist flows (Riley and Van Doren, 1992; Tooke and Baker, 1996; Riley, Baker and Van Doren, 1998) to exploring more complex topics such as travel motivations (Beeton, 2005; Riley and Van Doren, 1992), host communities (Goh, 2014), national identity (Jones & Smith, 2005), power relationships (Peaslee, 2010), marketing strategy challenges (Croy, 2010), effects on the management of destinations (Mordue, 1999; 2001), postmodern interpretations of authenticity and hyper-reality (Beeton, 2010).

Research into on-screen tourism has primarily been in the form of case studies, focusing on specific films, TV shows and destinations. One of the earliest successful stories about on-screen tourism is the Disney on-screen production focused on its theme parks in six cities in the US, Europe and Asia (Marling, 1997; Frost, 2009; Lundberg, Lexhagen and Mattsson 2012). It is reported that the Disneyland theme park in California attracted 18.29 million

visitors in 2015 and many of the visitors travelled to the park for the purpose of experiencing the Disney themed films (https://www.statista.com/statistics/236154/attendance-at-the-disneyland-theme-park-california/). LotR and New Zealand are well-explored example of the phenomenon, and the intersection between fiction and reality, authenticity and destination image have been researched (Buchmann, 2010; Buchmann, Moore and Fisher, 2010; Carl, Kindon and Smith 2007, Croy, 2010; Jones and Smith, 2005; Peaslee 2007; 2010; Tzanelli, 2004). Dracula tourism in Romania has also received a substantial amount of attention from researchers, who have explored the role of on-screen tourism in the transition of national identity and stereotypes post-Communism (Light, 2007; 2009; Shandley, Hamal and Tanase, 2006; Tanasescu, 2006). Much research has been devoted to the effects of screen productions in the UK, where media representations and the reimagining of landscapes in the footsteps of the young wizard Harry Potter have been examined (Iwashita, 2006; Lee, 2012). In Asia, the effect of South Korean TV series and celebrities on tourist flows, intention to visit and destination image have also received substantial interest by researchers (Kim, Long and Robinson, 2009; Kim and O'Connor, 2011; Kim, Agrusa, Lee and Chon, 2007; Lee, Scott and Kim, 2008; Lin and Huang, 2008).

The emotional ties that audiences create to characters, stories and places featured in screen productions have been identified as important motivations for travel. For some on-screen tourists, the screen productions are the primary travel reason, while others may engage in screen production activities (e.g., a film tour or theme park visit) as part of their visit to a destination, while initially having a different travel purpose (Kim and Richardson, 2003). The mythology of place, transformed and communicated through the screen production, may be what attracts on-screen tourists, and not the destination per se (Connell, 2004). On-screen tourism travel motives can then be regarded as more complex, going beyond traditional origin-destination push-pull models. Tourists may travel to the film destinations to re-enact and experience events from the production, or to reconnect to a feeling that they had when they watched the film or TV drama. They may also seek to strengthen the mythology of the place, engage in fantasies based on the production, or spend time with like-minded people. A visit to an on-screen destination may also bestow the status of having visited a place featured in an on-screen production, or even to engage in celebrity spotting during filming (Beeton, 2005; 2006; Buchmann, Moore and Fisher, 2010; Lundberg, Lexhagen and Mattsson, 2012; Roesch, 2009).

The marketing of destinations as on-screen tourism locations has been proven to be effective, and is becoming increasingly more attractive worldwide (Lundberg, Lexhagen and Mattsson, 2012). For example, one in five overseas visitors to the UK claim that TV shows or films provided them with reasons to visit (Steele, 2008), creating £1.8 billion in visitor income (Oxford Economics, 2012). Grihault (2003) also identified the role of films in increasing visitor numbers, but noted that marketing campaigns in the film's release cycle

were crucial in achieving this. There are numerous examples of destinations capitalising on image transformation resulting from being featured on-screen, such as Westeros in Ireland (Game of Thrones) in addition to New Zealand's Middle Earth (LotR and The Hobbit). Marketing strategies developed for these destinations must take into account the effects of location dissonance (Beeton, 2005; Frost, 2009), which can arise when visitors arrive at a destination they have seen on screen but are disappointed by the lack or absence of physical cues similar to their screen experience. Research has shown that destinations meet the needs of on-screen tourists in different ways and adapt their marketing strategies accordingly. The strategies can be a result of the screen production and the destination's characteristics and resources (Connell, 2004; Croy, 2010; Hudson and Ritchie, 2006; Lundberg, Lexhagen and Mattsson, 2012). For example, the highly successful screen production phenomenon the Twilight Saga is based on a four-volume book series and five films, and has resulted in both setting and location tourism in the US, Canada and Europe. Though the destinations are used in the same screen production, they all approach on-screen tourism differently. For example, the strategy of the primary setting destination, Forks, a small town in north-western America was to more or less 'go all-in', fictionally reconstructing the environment to fit the needs and expectations of on-screen tourists looking for a fabricated authenticity of place. The Italian destinations, Volterra (setting) and Montepulciano (location), however, developed marketing strategies based on merging the cultural heritage with the modern screen production theme. On-screen development and destination marketing strategies therefore depend on the destination's experienced need for tourism development and the character of the place (Larson, Lundberg and Lexhagen, 2013).

The Economic Impact of On-screen Tourism

A number of news, industry and government reports have claimed that on-screen tourism contributes significantly to the economy, but they lack the support of rigid academic methodology. Through visitor surveys at eight filming locations in England, such as Alnwick Castle (Harry Potter) and Lyme Park (Pride and Prejudice), it was found that the on-screen-induced tourism contributed between £100 million and £140 million to the national economy in 2014 (Creative England, 2015). Data collected at the eight sites was amplified to evaluate the economic impact of on-screen tourism on other locations, and to estimate the overall contribution to the national economy. The assumptions on the spillover effects of the filming sites to other locations not associated with the films were unreliable. One news headline stated that 1 in 10 tourists were inspired to visit the UK by British films such as Harry Potter and Sherlock Holmes (the Telegraph, 2010), which is clearly an overstatement.

Many studies have explored the economic effects of films and TV dramas on tourism demand (Kim, Agrusa, Lee and Chon, 2007). These effects are justified if the motivation of the majority of tourists arriving at a destination is an associated film or TV drama. Tooke and

Baker (1996) found that four British TV series; To the Manor Born, By the Sword Divided, Middlemarch and Heartbeat increased the number of visits to the film locations. Riley, Baker and Van Doren (1998) showed the long-term effects of movies on visitor increases through collecting data at 12 US film locations. Busby and Klug (2001) found that the film Notting Hill was the reason for the majority of their respondents visited the area in London. Busby, Huang and Jarman (2013) found that Rick Stein and his food TV shows are key factors encouraging tourists to visit Padstow in Cornwall. Instead of focusing on particular films or TV shows, Young and Young (2008) evaluated the motivation to visit Oxford and the London Eye, which have appeared in many films and TV shows. They found that on-screen products can contribute to visitor numbers, but these were only a partial reason for tourists to visit the two locations. The Harry Potter book and film series have resulted in a 100 per cent increase in visits to one of the locations featured on screen (Mintel, 2003). The positive relationship between the LotR and visitor numbers in New Zealand has also been explored (Mitchell and Stewart, 2012), and while these studies tested the impacts on tourism demand, they used either small-scale questionnaire surveys or estimated the total impact through a rough aggregation based on unreliable assumptions (e.g., using data obtained from one survey at a particular location amplified to the whole nation) rather than conducting rigid economic modelling exercises. The scale of the economic impact was not measured by contributions to GDP, employment, etc.

Research into the economic impact of film tourism in general and the LotR/Hobbit films in particular has been limited. Primarily, calculations have been based on the marketing value of a film(s) and the income generated for the host community during film production. The estimation by the research company NFO New Zealand (2003) of the marketing value linked to the LotR Trilogy based on audience size and commercial value is an example of the former. Monetary Publicity Value (MPV) (Caselltort and Mäder 2010) was used to evaluate the Swedish Millennium movie series' impact on the capital city, Stockholm. This model based its estimates on the frequency the capital was featured in the films, and the audience size. The income generation for the host community during filming of the series was calculated based on the production budget investments in the region (e.g., services, accommodation, transport and wages) (Cloudberry Communications, 2011). Attempts have been made to estimate film tourism effects in New Mexico, USA, in terms of tourists' spending, state and local taxes and new jobs in the region (Southwest Planning & Marketing and CRC & Associates, 2008). Unlike more rigid economic models, these methods cannot capture the longer term and broader economic impact brought by on-screen tourism.

Few studies have evaluated the impact of film tourism on destination economies with economic modelling techniques, but two types of economic models, econometric and computable general equilibrium (CGE), have been used. Econometric models examine the relationship between films and tourism demand. Mitchell and Stewart (2012) used a time-series model to assess the impact of films on changes in foreign tourist number in Australia and New Zealand. They found that after the Mad Max and the first two Crocodile Dundee

films were released the number of tourist arrivals to Australia increased, but after 10 months of growth due to Mad Max a decline was observed. Their results also revealed that the first two LotR films brought no significant effect on tourism, the third film increased tourist number for two years, but a decrease was found thereafter. Kim, Chen and Su (2009) used Chow tests and discovered that Korean TV dramas brought a significant structural change in visitor arrivals from Taiwan. Though econometric models can capture the effects of films on tourism demand using time-series data, the overall impacts on the economy in terms of householders' income, employment and industry output are difficult to evaluate.

The CGE model, however, can be used to examine the changes in tourism demand alongside other economic indicators such as welfare, employment and industry outputs. Pratt (2015) applied a static CGE model to evaluate the economic impact of the film Borat: Cultural Leanings of America for Make Benefit Glorious Nation of Kazakhstan on the national economy of Kazakhstan. The study found that the film reinforced the image of Kazakhstan, increasing tourist arrivals, but eventually brought a loss to GDP of US$2.78 million, as the increase in tourism crowded out other sectors. The validity of the CGE model results largely depends on the input of the model, which in this case is the change in tourism demand. A limitation of Pratt's (2015) study is that the estimation of changes in tourism demand is based on secondary data of the overall tourism increase and on previous studies. However, the increase in tourism demand is not specific to film-induced tourism, and data used in previous studies may not be suitable for the case of Borat in Kazakhstan.

To overcome the limitations of the econometric and CGE models, in this study we propose an innovative approach, combining both methods in the estimation of on-screen tourism with a view to generating more reliable results.

The Lord of the Rings and Hobbit Films and New Zealand

The LotR and the Hobbit films, which were shot in New Zealand, are all based on books written by J.R.R. Tolkien and brought to the screen by director Peter Jackson and the production companies New Line Cinema, Metro-Goldwyn-Mayer and WingNut Films. They comprise six epic films featuring a fantasy world called Middle Earth. The story of the LotR (2001-2003) follows the main protagonist, hobbit Frodo Baggins, as he and his fellowship set out to destroy the One Ring and, by doing so, destroy the dark Lord Sauron (The Fellowship of the Ring, 2001; The Two Towers, 2002; The Return of the King, 2003). The Hobbit Trilogy films (2012-2014) are prequels to the LotR Trilogy, and tell the story of hobbit Bilbo Baggins, who together with his dwarf friends embark on a quest to reclaim their mountain home from an evil creature (An Unexpected Journey, 2012; The Desolation of Smaug, 2013; The Battle of the Five Armies, 2014). Most external shot locations were filmed in New Zealand (The Fellowship of the Ring, 2001; The Two Towers, 2002; The Return of the King, 2003; An

Unexpected Journey, 2012; The Desolation of Smaug, 2013; The Battle of the Five Armies, 2014).

It is estimated that the marketing value of the films for New Zealand was US$42 million (NFO New Zealand, 2003). The project attracted interest due to its systematic and strategic methods, uncharacteristic of most on-screen destinations, developing relationships with the creative industry and carrying out international marketing. An international visitor survey in 2004 (following the release of the LotR trilogy) found that 6% of 120,000–150,000 people indicated that the films were one of the main reasons for choosing to visit New Zealand (Tourism New Zealand, 2015). The government's active role in promoting New Zealand in relation to the LotR's Middle Earth and launching the campaign 'New Zealand: Home of Middle Earth' have been put forward as explanations of why the country experienced a rise in on-screen tourism (Leotta, 2011; Victoria, 2016). A more recent survey reported that about 13% of visitors claimed that the Hobbit Trilogy influenced their travel to New Zealand (New Zealand Ministry of Business, Innovation and Employment, 2016) and that the rapid growth in the number of tourists from premium markets such as the UK, US and Germany was also related to film tourism (Financial Times, 2015). The increase in visitor numbers could also be related to the New Zealand Tourism Authority's '100% Middle Earth: 100% Pure New Zealand' campaign, which targeted international markets with great success (New Zealand, 2016). The campaign was built on New Zealand's existing '100% Pure New Zealand' campaign, first launched in 2000 (Cabi, 2012). Tourism New Zealand reportedly spent approximately NZ$30 million in marketing the country in the wake of the Hobbit movies (the Wireless, 2014). The investments made by the tourism authority of New Zealand, the government and the national carrier Air New Zealand in strategically marketing the country as Middle Earth explains its on-screen tourism success, according to researchers and tourism representatives alike (Forbes, 2012; Skift, 2015; the Wireless, 2014). This strategic investment included partnerships with traditional media to gain editorial publicity, with tourism brands with online platforms such as Lonely Planet, and the development of Tourism New Zealand's own digital marketing strategy (Brandingbeat, 2016; Skift, 2015; Stoppress, 2013). Their '100% Middle Earth: 100% Pure New Zealand' campaign even resulted in the top tourism marketing award: the 'World's Leading Destination Marketing Campaign' in the World Travel Awards 2012 (Stoppress, 2012).

Methodology

This study first uses the econometric approach to capture the direct influence of film tourism on increased tourism expenditure, followed by the application of the CGE model to evaluate the total economic impact on household welfare. According to Blake, Durbarry, Eugenio-Martin, Gooroochurn, Hay, Lennon, Sinclair, Sugiyarto and Yeoman (2006), econometric and CGE models complement each other. CGE modelling can simulate the total economic impacts of a demand shock to the economy by taking into account interactions

among production sections, labour, capital, households, governments, exports and imports. Econometric modelling evaluates the causal relationships between tourism demand and various determinants, such as prices and income. The changes in tourist expenditure estimated from the econometric model are the key data inputs for the CGE model, which should generate more accurate and reliable results than estimations based on crude questionnaire data (Li and Song, 2013).

Econometric Modelling

To estimate the direct influence of films on New Zealand inbound tourism demand, two film dummy variables, LotR and the Hobbit, are included in the tourism demand function. This study uses the error correction model (ECM) represented by the autoregressive distributed regression model (ADRM), developed by Pesaran, Shin and Smith (2001) and adopted by Song, Gartner and Tasci (2012).

$$\begin{aligned}\Delta lnTA_{it} = \alpha_0 &+ \sum_{j=1}^{p} \varphi_{1j}\, \Delta lnTA_{it-j} + \sum_{j=0}^{p} \varphi_{2j}\, \Delta lnGDP_{it-j} + \sum_{j=0}^{p} \varphi_{3j}\, \Delta lnRP_{it-j} \\ &+ \sum_{j=0}^{p} \varphi_{4j}\, \Delta lnSP_{it-j} + \pi_{1i} lnTA_{it-1} + \pi_{2i} lnY_{it-1} + \pi_{3i} lnP_{it-1} + \pi_{4i} lnP_{st-1} \\ &+ DQ2 + DQ3 + DQ4 + D97 + D01 + D03 + D08 + DRlord + DRhobbit \\ &+ \varepsilon_t\end{aligned}$$

where

- Δ is the 1st difference operator (i.e., $\Delta X_{it} = X_{it} - X_{i,t-1}$);
- p is the number of lags, determined by the Akaike Information Criterion (AIC) and Schwarz information criteria (SIC);
- $\mathrm{TA}_{i,t}$ is the number of tourist arrivals to New Zealand from country i at time t;
- $\mathrm{GDP}_{i,t}$ is gross domestic product of country i at time t, a proxy for tourist income of the source market;
- $\mathrm{RP}_{i,t}$ is the price level of tourism in New Zealand relative to that in country i at time t, which is calculated by $\frac{CPI_t^i / EX_t^i}{CPI_t^{NZ} / EX_t^{NZ}}$;
- $\mathrm{SP}_{i,t}$ is the substitute price at time t, which is calculated by the price (CPI) of its competitive destination, i.e., Australia;
- DQ2, DQ3 and DQ4 are the seasonal dummies for the second, third and fourth quarters of a year;
- $D97$, $D01$, $D03$ and $D08$ are dummy variables that indicate the possible influences on tourism from the 1997 Asian financial crisis (=1 for 1997Q3–1998Q2), the 2001 terrorist attack (=1 for 2001Q3–2001Q4), the 2003 SARS epidemic (=1 for 2003Q2) and the 2008 global financial crisis (=1 for 2008Q3–2009Q2);
- $DRlord$ is the dummy for the LotR films, where the value is 1 for periods of impact (=1 for 2001Q4–2004Q4), and 0 for other periods;
- $DRhobbit$ is the film dummy related to the Hobbit (=1 for 2012Q4 - 2015Q1); and

- ε_{it} is the error term.

The increases in international tourist arrivals are estimated based on the assumption that there is a long-run co-integration relationship between tourist arrivals and other variables (Song, Gartner and Tasci, 2012). The increases in tourist arrivals are calculated by comparing the fitted numbers of tourist arrivals with the DRhobbit dummy. This model uses both current and lagged variables reflecting a dynamic decision-making process by tourists (Song, Gartner and Tasci, 2012). The dummy for the LotR films ($DRlord$) starts at the first film's (The Fellowship of the Ring) release date, and ends one year after the release of the third, 'The Return of the King', when home media DVDs of all three movie were available on the market. Similarly, the dummy of Hobbit ($DRhobbit$) starts at the first film's (An Unexpected Journey) release date and ends one quarter after the release of the third movie 'The Battle of the Five Armies', when home media DVDs of all three movie were available on the market.

Secondary data on quarterly tourist arrivals were obtained from the International Visitor Survey provided by the New Zealand Ministry of Tourism. Other data, including GDP, CPI and exchange rate with 2005 as the base year, were obtained from the International Monetary Fund (IMF). The data cover the 1995Q1–2015Q1 period. The tourist arrivals data cover 12 major origin countries and regions: the US, China, Japan, Singapore, Thailand, UK, Hong Kong, Germany, South Korea, Australia, India and Canada.

CGE Modelling

To estimate the total economic impact of the two films, we construct a New Zealand static CGE model based on the 2006/2007 New Zealand Input-Output (I-O) tables, which is the most updated dataset formulated by Statistics New Zealand (2012). These I-O tables consist of 106 industries and other economic agents, such as households and production factors. They depict the economic structure and interactions between industries in New Zealand.

The first step in the modelling process is to construct the standard New Zealand CGE model, which follows the model structure designed by Lofgren, Harris and Robinson (2002). The important functions involved in the CGE modelling exercise include the Leontief transfer matrix, the specification of the Cobb-Douglas production function with constant elasticity of substitution and constant elasticity of transformation technology explained in Li, Blake and Cooper (2011). To model the impacts of the two films, the I-O tables are updated to 2014 prices.

The second step is to extend the standard model to capture changes in international tourism demand. To model tourism demand, the activities of a new sector (the tourism export sector) and a new group of customers (international tourists) are built into the standard CGE model based on Wattanakuljarus and Coxhead (2008). The tourism sector

exports tourism related goods such as transport, accommodation and catering. International tourists as customers demand tourism products. The extension requires two procedures: first, to separate total exports in the New Zealand I-O tables into tourism and non-tourism exports, and second, to incorporate two new functions into the standard model. The tourism exports in the I-O table are introduced based on the share of international tourism expenditure by type of products produced by Statistics New Zealand (See Table A2). Non-tourism exports are generated by deducting tourism exports from the original total exports in the I-O tables.

The two new functions introduced into the standard CGE model are used to describe activities of the tourism sector and international tourists (Wattanakuljarus and Coxhead, 2008; Li et al., 2011). The demand for the Cobb-Douglas aggregate tourism product is a function of the aggregate tourism price, which is

$$q^T = \overline{Q^T}\left(\frac{e}{p^T}\right)^{\mu-1}$$

where

- q^T is the quantity demanded by inbound tourists;
- $\overline{Q^T}$ is the benchmark quantity demanded by inbound tourists;
- p^T is the aggregate price of international tourism;
- e is the exchange rate; and
- μ is the price elasticity of international tourism demand adapted from the calculation by Schiff and Beckon (2011).

p^T can be calculated by using a Cobb-Douglas function,

$$p^T = \lambda \prod_n p_i^{\alpha_i}$$

where

- λ is a shift parameter; p_i is individual product price;
- $\sum_i \alpha_i = 1.$

The total economic impacts of film tourism are presented at two levels, macro and industry, in the next section. The change in welfare measured by equivalent variation (EV) is one of the key findings at the macroeconomic level. EV in this study can capture the economic impacts of film tourism on household income, which is explained by the difference in the

amount of income between the situation without the LotR and Hobbit films (Benchmark) and with the films (Andriamananjara, Dean, Feinberg, Ferrantino, Ludema and Tsigas, 2004). It thus measures the household welfare gains due to the demand shock generated by the films. EV has widely been used in the literature that applies CGE models (e.g., Ahmed 2008; Li and Song, 2013). EV is considered to be a better indicator of the net welfare gains to households than GDP, as it also contains welfare gained by non-residents (Abelson, 2011). The results are also displayed at the industry level. To focus the presentation of the results on the effects on tourism-related industries, the original 106 industries in the New Zealand I-O Table are aggregated into 12 industries that include primary and secondary tourism-related industries and other tertiary industries (See Table 4 for the list of industries).

Results and Discussion

The econometric and CGE modelling results reveal that the Hobbit Trilogy brought significant effects on tourist arrivals in New Zealand from the US, China, Japan, Singapore, Thailand, UK, Hong Kong, Germany and South Korea, which led to a further increase in welfare gains, but insignificant effects on tourist arrivals from Australia, India and Canada. In contrast, the results of the econometric models reveal that the coefficients of the dummy variables for the LotR films (DRlord) are statistically insignificant related to all of the origin countries and regions (See Table A1). This indicates that the demand for New Zealand tourism is not affected by LotR. The results contradict many of the claims in the media, but are to a large extent consistent with those of Mitchell and Stewart (2012), who did not find significant effects for the first two LotR films. One reason could be that more effective marketing strategies were applied during and after the launch of the Hobbit to promote New Zealand as a film destination, newly branding the country as '100% (Pure) Middle Earth'. A second possibility is that the Hobbit strengthened the image of Middle Earth in New Zealand already created by the LotR, and thus the film tourism induced by the Hobbit also partially benefited from the LotR.

The results of the econometric modelling of the increase in tourist arrivals and receipts due to the Hobbit are given in Tables 1 and 2. The results of the GCE modelling of the economic impacts at the macro-economic and industry levels are shown in Tables 3 and 4. The key model input for the CGE modelling is the total tourism receipts brought by the Hobbit (US$771.80 million in Table 2), calculated by the econometric models. The key model output of the CGE model is the change in welfare, which is US$186.24 million (see Table 3).

Table 1 shows that the Hobbit Trilogy increased international tourist arrivals by 214,811 between 2013 and 2014. Apart from South Korea, the hobbit films attracted more tourist arrivals to New Zealand from each origin market in 2014 than in 2013. Of the nine source markets, the two that brought the largest number of tourist arrivals due to the Hobbit were China (64,337) and the UK (48,467). China is an emerging market with rapid growth in

outbound tourism, and the original novels of the LotR and Hobbit, written by English writer J.R.R. Tolkien, have gained popularity in the UK. The average percentage changes in each origin country/region brought by the Hobbit range between 5.52% (the US) and 23.00% (Thailand).

In Table 2, increased international tourist receipts to New Zealand due to the Hobbit are calculated by multiplying the increased number of tourist arrivals by the average spending per visitor. The data on average tourist expenditure from different source markets are unavailable, so the average expenditure per visitor for all source markets is used. All economic benefits from the nine source markets where significant effects were found are aggregated. The Hobbit Trilogy in 2013 is shown to have increased tourist arrivals by 104,745 from 9 major origins, which resulted in a US$374.62 million income increase for New Zealand. In 2014, tourist arrivals increased by 110,066, along with an additional US$397.18 million tourist receipts. In total, the Hobbit Trilogy brought an additional US$771.80 million international tourist receipts to New Zealand.

Table 1. Increased International Tourist Arrivals to New Zealand Due to the Hobbit Trilogy

	2013	2014	2013 and 2014	Average Change %
USA	10751	12069	22819	5.52%
China	30779	33558	64337	12.93%
Japan	8351	8601	16952	10.94%
Singapore	3012	3283	6295	7.24%
Thailand	4750	4910	9661	23.00%
UK	24074	24393	48467	12.69%
Hong Kong	4651	4653	9304	15.81%
Germany	5864	6472	12336	8.31%
South Korea	12513	12127	24640	18.89%
Total	104,745	110,066	214,811	-

Note: The average change rate is calculated by comparing the fitted numbers of tourist arrivals (Tables A1) when the dummy equals 1 and 0.

Table 2. Increased International Tourist Receipts to New Zealand due to the Hobbit Trilogy (from nine major origins)

	2013	2014	Total
Tourist arrivals (a)	104,745	110,066	214,811
Tourist expenditure per capita (b) (US$)	3576.51	3608.52	-
Tourism receipts (c)=(a)*(b) (million, US$)	374.62	397.18	771.80

Notes: (1) Australia, India and Canada are omitted from the DRhobbit dummy due to the insignificant effects of DRhobbit on tourist arrivals visiting New Zealand. Therefore, increase in tourist arrivals, i.e., (a) is calculated by adding the differences in tourist arrivals from nine countries when the DRhobbit dummy equals to 1 and 0; (2) the source of tourist expenditure per capita in New Zealand for the years 2013 and 2014, i.e., (b), is Statistics New Zealand, 2015 and (3) Receipts (c) are adjusted to 2014 price levels. The direct economic effect of the Hobbit Trilogy on tourism is calculated by multiplying the increased number of tourist arrivals by the average spending per visitor.

Table 3 presents the macro-economic level effects due to the Hobbit films. The increased international tourist receipts (US$771.80 million) generated a welfare gain of US$186.24 million to New Zealand households. The real tourism consumption (US$739.30 million) is lower than the increased international tourist receipts (US$771.80 million), mainly because the former takes into account a decrease in the percentage of the price of international tourism consumption by 0.68. Every additional US$1 of real tourism consumption increased welfare by 25 cents.

When the increased international tourist receipts of US$771.80 million brought by the Hobbit films filtered through the New Zealand economy, they influenced industries through the supply chain. Table 4 displays the industry-level impacts generated from the CGE model. Tourism-related industries are seen to have experienced a boom due to the Hobbit Trilogy, which increased tourism exports by US$598.14 million. Among the tourism-related industries, air transport brought the largest tourism exports, valued at US$166.80 million. International tourists may have spent most of their money on airline tickets, given that New Zealand is a long-haul destination for most of the origin countries and regions.

The highest increase in percentage change of output can be seen in air transport, accommodation and food and beverage, which may be due to high tourism demand for products and services from these industries. The increased tourism demand put up prices,

with the increased percentage change of price index ranging from 0.57 to 0.83 across all industries. Tourism related industries experienced an increase in the value of employment by US$159.54, and in the value of capital by US$99.47 million. The largest increases can be observed in the food and beverage and retail industries, indicating that wages paid to the employees and interests of capital in the two industries had the largest change.

The tourism boom appears to have largely affected other tertiary industries, with an increase of US$187.15 million in tourism exports and US$111.61 million in the value of capital, but these are relatively small when spread across the 44 industries within this category. However, the tourism boom reduced the change in the values of labour and capital in both primary and secondary industries. This can be explained by the resource scarcity assumption within an economy, as the labour and capital tend to flow out from primary and secondary industries to tourism-related industries due to the tourism boom. The tourism boom also bids up the price indexes in the primary and secondary industries, which reduces the percentage change of output by 1.35 and 0.66. This crowding out effects captured by CGE models has also been observed in the previous studies (Adams and Parmenter, 1995 and Blake, Arbache, Sinclair and Teles, 2008).

Table 3. Economic Impact Due to the Hobbit Trilogy

	Economic impact
Welfare gain (million US$)	186.24
Increased international tourist receipts (million, US$)	771.80
Real tourism consumption (million, US$)	739.30
Change in price of international tourism consumption (%)	0.68
Welfare gain per change in real tourism consumption	0.25

Table 4. Industry-level Impact Due to the Hobbit Trilogy

Industries	Change in tourism exports (million, US$)	Percentage change of output (%)	Percentage change of price index (%)	Change in value of labour (million, US$)	Change in value of capital (million, US$)
Primary industry	-	-1.35	0.68	-41.65	-102.67
Secondary industry	-	-0.66	0.78	-148.44	-108.42
Tourism-related industries	598.14	-	-	159.54	99.47
Accommodation	87.45	3.16	0.83	25.94	17.96

Food & beverage	134.49	2.26	0.71	44.14	22.55
Road transport	39.78	0.20	0.57	2.69	3.82
Railway transport	2.27	0.18	0.66	0.22	0.36
Air transport	166.80	3.25	0.63	33.22	5.00
Communication	26.87	0.29	0.66	5.46	11.59
Health insurance	2.30	0.04	0.67	0.04	0.45
Recreation	13.82	0.42	0.66	4.43	2.54
Retail	124.36	0.72	0.66	43.40	35.20
Other tertiary industry	187.15	0.12	0.67	30.53	111.61

Notes: (a) The numbers displayed for tourism-related industries is the sum of the nine tourism-related industries. (b) Change in tourism exports in Primary and Secondary industries are too small to be included in the table. (c) Primary industry includes 7 farming and agriculture related industries. (d) Secondary industry includes 36 manufacturing related industries. (e) Other tertiary industry includes other 45 services related industries. (f) Accommodation, Food & beverage, Road transport, Railway transport, Air transport, Communication, Health insurance and Recreation are nine tourism-related industries that directly provide products and services to tourists. Communication consists of two industries; postal and delivery services, and telecommunications services. Recreation contains two industries; heritage and artistic activities, and sport and recreation activities. Retail includes eight retailing industries that sell different products, such as fuel, food, clothing and personal accessory.

Conclusions and implications

In this study, the economic impacts of on-screen tourism were evaluated, with a particular focus on the LotR and the Hobbit, filmed in New Zealand. As one of the first studies to evaluate and compare the effects of the two series of films, an innovative approach combining two types of modelling was used: econometric and CGE techniques. Econometric modelling, in particular ECM-ADRM, was applied to capture the relationship between tourism demand and influencing factors such as income, prices and films. CGE modelling assessed the macroeconomic and industry impacts of on-screen tourism in New Zealand, by taking into account the feedback effects among different industries and economic agents such as households and government. The main findings reveal that the Hobbit increased tourism receipts by US$771.80 million, which contributed to welfare gains of US$186.24 million in New Zealand.

The media claimed that the LotR films significantly increased tourist arrivals in New Zealand by up to 50%, based on tourist surveys (e.g., Forbes, 2012). However, this claim lacks rigorous academic support. The results of the study show that the LotR Trilogy did not have any significant impact on the tourism and economy of New Zealand, probably due to the lack of proper marketing strategies and investment. The diversion effects suggested by Mitchell and Stewart (2012) may also be a factor. Diversion effects refer here to tourists who divert from other destinations in New Zealand and travel to the filming locations. It appears that the LotR increased tourist arrivals at the film set, but the total arrivals did not change significantly. Survey questionnaires can gather information on the percentage of tourists travelling to New Zealand due to the films, but it cannot capture the diversion effects. Thus, it is more appropriate to use economic modelling to capture the relationship between changes in tourism demand and the impacts of films. The application of econometric modelling alone cannot assess the effect on the total economy and industries, but this can be evaluated by CGE modelling. Therefore, using both econometric and CGE models can generate a more reliable and comprehensive view of the economic impact of on-screen tourism.

The Hobbit was found to have significant positive impacts on the New Zealand economy through film induced tourism, which can be attributed to different factors. The proper implementation of promotional strategies during and after the movie can enhance the effect, which is noted in the literature. For example, Grihault (2003) pointed out that marketing campaigns at the film release stage is important in boosting film tourism. During the launch of the Hobbit films, investment was put into promoting New Zealand internationally as a film destination and the campaign '100% (Pure) Middle Earth' under the brand '100% Pure New Zealand' was launched in August 2012 (Scoop, 2013). The success of the campaign is reflected in the significant economic contributions to the economy. The stories of the two series of films are connected and both help to associate New Zealand with Middle Earth. The findings of this study provide useful suggestions for destination marketing agencies on how film-induced tourism can be best used to benefit the destination economies. An important strategy in the promotion of on-screen tourism destinations is to create an iconic concept, such as Middle Earth in the Hobbit. An icon or focal point for visits in the context of on-screen tourism refers to the symbolic content of a film or TV drama (Riley et al., 1998). The Hobbit recirculated and reinforced the association with Middle Earth initially built by the LotR. To some extent, the success of film tourism from the Hobbit can be partially attributed to the LotR.

Media convergence, that is, 'when topical stories are recirculated and adapted to multiple media platforms', can also be used to explain the tourism benefits brought by the Hobbit (Gyimóthy, Lundberg, Lindström, Lexhagen and Larson, 2015). Media convergence increases the 'likelihood and frequency' of the series stories in LotR and the Hobbit, and further connects on-screen tourists with 'the narrative and its characters' (Gyimóthy et al., 2015). As the LotR was the first instalment in the series it could not reap the benefits of media conversion that the Hobbit may have gained from being the second instalment. The tourism benefits brought by the Hobbit were reinforced through partnerships developed between

the government, tourism agencies and creative industries. For example, to support the filming of the Hobbit in its destinations and protect the creative industry, the New Zealand government altered the Employee Relations Act of 2000, which considered film workers as independent contractors, and expanded the national film subsidy programme, which provided the Hollywood studio Warner Bros with a $25 million tax rebate (the Guardian, 2010; International Business Publications, 2015). Additionally, there were better selections of product development on air transport to New Zealand and at destinations, which may also explain the success in the wake of the Hobbit. A limitation of this type of evaluation is that the approach requires secondary data, such as tourism demand, GDP, price index and national accounts, and some destinations may not have access to these data. Future studies may consider evaluating the economic impact of on-screen tourism on both filming and non-filming locations within a country, to test the existence of diversion effects and the long term impacts could also be conducted.

Appendix

Table A1 Estimates of the demand model of New Zealand with dependent variable D (LNTA)

Explanatory variable	Australia	USA	China	India	Japan	Singapore	Thailand
C	0.746**	2.403***	3.901***	0.972*	4.297	0.647	6.717***
LNTA (-1)	-0.304***	-0.493***	-0.439***	-0.210**	-0.268**	-0.138	-0.478***
LNY(-1)	0.700***	1.099***	1.117***	0.879***	0.012	-0.071	-0.246
LNPI(-1)	0.098	0.175	0.260	0.177	0.063	-0.336***	-0.342**
LNPS(-1)	-0.047*	-0.442***	-1.025***	-0.800***	-0.409**	0.139	-0.141
D(LNTA(-1))		-0.369***	-0.091	-0.601***	-0.471***	-0.426***	-0.417***
D(LNTA(-2))	0.142	-0.659***		-0.430***	-0.253**	-0.383***	-0.340***
D(LNTA(-3))		-0.419***	-0.113	-0.296***	-0.229**	-0.544***	-0.254**
D(LNTA(-4))			0.192**				
D(LNTA(-5))							-0.214***
D(LNY)		2.568*					
D(LNY(-1))			-1.591***	-1.773***			
D(LNY(-2))	-2.322***			-1.854***	4.964***		
D(LNY(-3))							-0.899**
D(LNY(-4))				-0.733		-0.849*	
D(LNY(-6))			0.378**				

D(LNPI)		-0.191					
D(LNPI(-2))				0.906**			
D(LNPI(-3))	-0.551***						
D(LNPI(-4))							-0.887***
D(LNPS)			-0.608*				
D(LNPS(-1))	0.144*	0.270**		0.526*			0.5975**
D(LNPS(-2))	0.157*		1.191***		0.632**	0.440**	
D(LNPS(-3))	-0.197**		0.738**				0.504*
D(LNPS(-4))	0.255***		0.554*	0.521*		0.302	0.993***
D(LNPS(-6))			0.861**				
DRLORD				-0.083			
DRHOBBIT		0.057*	0.138**		0.116**	0.075*	0.261***
DQ02	-0.137***	-0.229***	-0.816***		-0.544***	0.2453	0.363***
DQ03	0.193***	-0.280**		-0.486***	-0.183**	0.285**	
DQ04	0.249***	-0.152*		0.168		0.702***	
D97	0.043*						-0.634***
D01		-0.097**			-0.253***	-0.147**	-0.308***
D03			-0.932***	-0.475***	-0.348***	-0.193**	-0.642***
D08			-0.198**				
R^2	0.962	0.988	0.895	0.960	0.944	0.987	0.964
Adjusted R^2	0.953	0.985	0.861	0.948	0.931	0.983	0.952
AIC	-3.698	-2.783	-1.110	-1.363	-1.549	-2.091	-1.304
SBC	-3.207	-2.296	-0.519	-0.806	-1.093	-1.565	-0.713
Bound test							
F-statistics	4.818**	7.471***	8.831***	5.579**	5.296**	3.994*	13.106***
t-statistics	-3.860**	-3.230	-4.789***	-2.205	-2.454	-1.336	-4.966***
Diagnostic test							
Serial correlation	0.398	2.503*	1.360	1.713	0.858	0.595	0.111
ARCH	0.238	0.123	0.405	0.406	0.117	0.696	0.873
Heteroscedasticity	0.280	1.071	0.538	0.856	1.726*	1.156	0.720
Normality	5.525*	0.800	0.901	0.192	46.361***	2.018	2.326
RESET	0.171	1.028	0.481	2.661	0.7090	2.618	1.279

Note: a: ***, ** and * represent significance at the 1%, 5% and 10% significance levels.
b: The upper and lower Critical values for the partial F-statistics and the t-statistics were obtained from Pesaran et al. (2001), Table CI(iii) Case III and Table CII(iii) Case III with k = 3.
c: The Breusche Godfrey LM test is used to test for serial correlation; the ARCH test for autoregressive conditional heteroscedasticity; the White test for heteroscedasticity; the JarqueeBera test for normality and the Ramsey RESET test for model misspecification. ***, ** and * represent failure to pass the diagnostic test at the 1%, 5% and 10% significance levels, respectively.

Table A1 Continued. Estimates of the demand model of New Zealand with dependent variable D (LNTA)

Explanatory variable	UK	Canada	Hong Kong	Germany	Korea
C	1.446**	0.628	7.454***	0.968	10.964***
LNTA (-1)	-0.039	-0.157	-0.688***	-0.305**	-0.219***
LNY(-1)	-0.226	0.271	-0.534***	0.441	-0.183
LNPI(-1)	-0.286	-0.053	-0.303**	-0.098	-1.477***
LNPS(-1)	0.007	-0.042	0.369**	0.0452	0.716***
D(LNTA(-1))	-0.449***	-0.621***	-0.190*	-0.423***	-0.144*
D(LNTA(-2))	-0.551***	-0.606***		-0.275*	
D(LNTA(-3))	-0.293**	-0.550***		-0.280**	
D(LNTA(-4))				0.253***	
D(LNTA(-5))					
D(LNTA(-6))					
D(LNY)		4.481**		2.397**	9.430***
D(LNY(-1))		-5.742***	1.099**		
D(LNY(-2))		2.860*		-1.909*	
D(LNY(-3))					-4.871***
D(LNY(-4))					
D(LNY(-5))					
D(LNY(-6))				-1.682*	
D(LNPI)					-1.609***
D(LNPI(-1))				-0.319	
D(LNPI(-2))					
D(LNPI(-3))					
D(LNPI(-4))					
D(LNPI(-5))					
D(LNPI(-6))	0.492*			-0.603**	

D(LNPS)		-0.384**			
D(LNPS(-1))	0.463**	0.312*			
D(LNPS(-2))					
D(LNPS(-3))	0.392*				
D(LNPS(-4))				0.332**	0.681*
D(LNPS(-5))					
D(LNPS(-6))				0.643***	
DRLORD					
DRHOBBIT	0.136*		0.172***	0.087**	0.209***
DQ02	-0.785***	-0.566***	-0.414***	-0.812***	-2.442***
DQ03	-0.490***	-0.410***	-0.261***	-0.689***	-1.116***
DQ04					-1.929***
D97					
D01					
D03					
D08					
R^2	0.988	0.994	0.896	0.996	0.879
Adjusted R^2	0.986	0.992	0.882	0.995	0.854
AIC	-1.920	-2.582	-1.620	-2.442	-0.658
SBC	-1.484	-2.125	-1.321	-1.851	-0.229
Bound test					
F-statistics	6.601***	1.329	11.180***	1.638	5.379**
t-statistics	-0.276	-0.954	-6.473***	-2.033	-3.594*
Diagnostic test					
Serial correlation	0.297	1.962	0.683	0.280	1.190
ARCH	0.304	0.468	0.064	0.028	0.108
Heteroscedasticity	1.384	0.774	1.614	0.991	3.956***
Normality	55.709***	2.251	0.243	1.420	1.109
RESET	0.263640	0.487633	13.06396***	0.239615	32.12458***

Table A2. The composition of spending by international tourists

US$ (million), 2014	International demand	%
Accommodation services	904	11%
Food and beverage serving services	1,365	17%
Air passenger transport	1,667	21%
Other passenger transport	1,008	13%
Retail sales – fuel and other automotive products	496	6%
Retail sales – other	1,585	20%
Education services	369	5%
Other tourism products	585	7%
Total	7,979	100%

Source: Table 8, Tourism Satellite Account: 2014, Statistics New Zealand (2014).

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The Economic Impact of On-Screen Tourism: The Case of The Lord of the Rings and the Hobbit

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